

REMARKS

The applicants appreciate the Examiner's thorough examination of the application and request re-examination and reconsideration of the application in view of the preceding amendments and following remarks.

The Examiner rejects claims 1-3, 9, 11, 13, 15-17, 19, 21-22, 34-36, 38-41, 44-45 under 35 U.S.C. 102(b) as being anticipated by Zdeblick.

The applicants' claimed integrated electrofluidic system as now recited in claim 1 includes: 1) an electronic control system mounted on a support platform; 2) a microfluidic system embedded in the platform having an input and an output, and at least one electrofluidic component, and at least one embedded channel for circulating fluid over the at least one electrofluidic component; and 3) at least one electrical conductor carried by the platform for electrically interconnecting the electronic control system and the at least one electrofluidic component. Independent claims 38, 40, 44, and 46 recite similar features.

The innovative design of the integrated electrofluidic system utilizes a commercially available, low cost polymer material with a thin layer of adhesive which is machined and processed to define microfluidic and/or electronic components directly on the polymer material of the platform. Additional layers of the polymer/adhesive material are added and additional microfluidic and/or electronic components may be defined. The layers are then modified with a thin layer of adhesive which efficiently seals and bonds the layers. The result is an integrated electrofluidic system which is embedded in the support platform and includes microfluidic and/or electronic components. One or more embedded channels circulate fluid over the microfluidic and/or electronic components. The system also incorporates an electrical conductor embedded between the layers and carried by the

platform to provide an interconnection between the electrical components and the microfluidic components. The claimed integrated electrofluidic system includes a microfluidic system with embedded channels in the support platform that provide an interconnection between various electrofluidic components, e.g., a filter, dispenser reactor, heater concentrator, cooling device, flow sensor, temperature sensor, chemical sensor, biological sensor, and the like, that includes an input and an output. The at least one or more embedded channels of the electrofluidic system as recited in applicants' independent claims 1, 38, 40, 44 and 46 efficiently circulate fluid over various surfaces of the various electrofluidic components and sensors . *See* applicants' specification, page 11, lines 16-23.

In contrast, Zdeblick teaches and discloses a fixed volume of fluid sealed within a membrane chamber that is used to flex a membrane:

The volume of membrane chamber 10 is fixed except when the membrane 18 flexes. A fixed quantity of a gas or fluid is sealed in the membrane chamber 10. This may be done during the sealing of the membrane chamber by bonding a pyrex wafer 22 to the top surface of the wafer, i.e., the surface of the wafer 12 having the most positive z coordinates and normal to the z axis.

(Col. 6, line 64 to Col. 7, line 2 emphasis added.)

As shown in Fig. 1 of Zdeblick, the volume of membrane chamber (10) is clearly fixed except when membrane (10) flexes. Zdeblick relies on light energy from a light pipe (19) to heat the fluid in membrane chamber (10) causing membrane (18) to flex and operate as a sensor. Clearly, a membrane chamber with a fixed volume of fluid cannot be utilized as an embedded channel for circulating fluids over at least one electrofluidic component as now recited in applicants' independent claims 1, 38, 40, 44, and 46.

As shown above, Zdeblick does not teach, suggest, or disclose each and every element of the applicants' invention as recited in independent claims 38, 40, 44 and 46, namely, and at least one embedded channel for circulating fluid over at least one electrofluidic component. Accordingly, independent claims 1, 38, 40, 44, and 46 are patentable and allowable under 35 U.S.C. 102(b) over Zdeblick. Because dependent claims 2, 3, 9, 11, 13, 15-17, 19, 21-22, 34-36, 39, 41, and 45 depend from allowable base claims, these claims are allowable and patentable over Zdeblick.

The Examiner rejects claims 10, 12, 14, 18, 20, 23-33 and 42-43 under 35 U.S.C. §103(a) as being unpatentable over Zdeblick. The Examiner also rejects claims 5-8 under 35 U.S.C. §103(a) as being unpatentable over Zdeblick in view of Bergstresser *et al.* As shown above, Zdeblick does not teach, suggest or disclose each every element of the applicants' invention as recited in applicants' independent claims 1, 38, 40, 44, and 46. Bergstresser *et al* also fails to teach, suggest or disclose at least one embedded channel for circulating fluid over at least one electrofluidic component. Because claims 5-8, 10, 12, 14, 18, 20, 23-33, and 42-43 depend from allowable base claims, the Examiner's rejections of these claims under 35 U.S.C. §103(a) is traversed.

The Examiner rejects claims 1 and 37 under 35 U.S.C. §102(e) as being anticipated by Morse *et al.*

As shown above under amendment A, the applicants have amended claim 1 to now recite in part: "at least one embedded channel for circulating fluid over at least one electrofluidic component." Nowhere in the entire disclosure of Morse *et al.* is there any teaching, suggestion, or disclosure of at least one embedded channel for circulating fluid over at least one electrofluidic component.

• Accordingly, applicants' independent claim 1 is allowable and patentable under 35 U.S.C. 102(e) over Morse *et al.* Because claim 37 depends from claim 1, claim 37 is also allowable and patentable over Morse *et al.*

The Examiner rejects claims 1-4 under 35 U.S.C. 102(e) as being anticipated by Barth *et al.* The Examiner alleges that Barth *et al.* discloses a microfluidic device as claimed by the applicants that includes a Kapton film. As shown above, the applicants have amended claim 1 to recite in part: "at least one embedded channel for circulating fluid over at least one electrofluidic component." Nowhere in the entire disclosure of Barth *et al.* is there any teaching, suggestion or disclosure of at least one embedded channel for circulating fluid over at least one fluidic component.

Accordingly, claim 1 is allowable and patentable under 35 U.S.C. 102(e) over Barth *et al.* Because claims 2-4 depend from an allowable base claim, these claims are allowable and patentable under 35 U.S.C. 102(e) over Barth *et al.*

Each of the Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts, at (781) 890-5678.

Respectfully submitted,



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